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**SOME BYZANTINE / GREEK INFLUENCES ON THE EARLY WORK OF THE  
ANATOMIST ANDREAS VESALIUS (1514-1564)<sup>9</sup>**

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**Introduction**

500 years after the birth of Andreas Vesalius (1514-1564) it is appropriate to commemorate this first modern anatomist, doctor, scholar, and author. Different from other Vesalius-commemorations, however, we like to examine what - until the 16<sup>th</sup> century - happened to the knowledge of anatomy as described by Galen (130-210) [1] whose apparent “faults” were so effectively corrected by Vesalius.

**Historical developments.** Over the centuries, citizens of the Roman empire slowly but surely faced some changing attitudes towards the healthy human body. As advised by the influential bishop Augustine (354-430 CE), conscientious people should avoid to be lured into hedonism and its inherent bodily pleasures. Awareness of unwanted - especially visual - information, e.g., about the inner side of the living human body, was discouraged as well [2]. A disinterest in physical well-being was propagated, also characterized as "disdain for the flesh". Bodily asceticism - not to mention anorexia - in perseverant believers, some of whom became sanctified later, was considered highly - also literally - as the long-standing veneration of the so-called Stylites illustrates [3]. During a certain period of time, until about 850 CE, even the imaging of human bodies became problematic, at least for avid Byzantine so-called iconoclasts [4].

**The fate of classical medical texts.** Meanwhile in philosophy, (Platonic) reasoning gradually shifted towards (Aristotelian) empiricism. In medicine from about the 9<sup>th</sup>

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<sup>9</sup> Некое византийское / греческое влияние на ранние работы анатома Андреа Везалиуса (1514 - 1564)

century CE, the influential, pre-eminently empirical medical writings as formulated by the prominent physician and philosopher of Greek descent Galen (130-210 CE) were passed down in translations, more specifically those from the original Greek into Arabic [5]. “Galen started medical training with dissection, and went on to study physiology and the movements of human body, and then he came to an end with the subject of diagnosis” [5]. However, some Arabic summaries of Galen’s books, somewhat underemphasized the necessity of personally performing dissections [5]. Moreover, Galen’s comparative-anatomical, surgical and empirical background, deeply rooted in the typical Roman gladiator- and war-surgery [1], gradually became forgotten. The need for empiricism, however, continued to be supported by many scholars, e.g., the authoritative Iranian physician and writer Rhazes (854-925 CE) [6].

**Knowledge of original Greek texts.** In the next century, the so-called schism (1054 CE) between East and West meant the start of an ongoing separation between the interpretation of original Eastern European (Greek or Byzantine) science and the slowly progressing Western European (Medieval) science. Some argue “that this schism was catastrophic to both East and West; that the mystical and monastic sensibility of the East was, for the most part, lost to the West; the emphasis on Reason, and the scholasticism that gave rise to Western science, was lost to the East” [7]. Examples of such differences between East and West can be found in visual arts too. Illustrations, e.g., icons, show the so-called “Byzantine perspective”, being brought to perfection, especially in the East [8].

**The Renaissance.** From the dawn of the Second Millennium CE, Western European Medieval Universities cautiously applied two approaches: the *Platonic* reasoning and the *Aristotelian* empiricism. Concerning Galen’s anatomy, Platonism implied : blindly following the author’s *Greek* texts - be they handed down from *Arabic* summaries, translated into elegant, Ciceronian *Latin*. From about the Duecento which preceded Renaissance, many Western Universities advised their Medical Faculties to arrange at least one public dissection - better: an anatomical demonstration - a year, showing the infallibilities of Galen’s texts. During Renaissance however, arts (e.g., Leonardo da Vinci, 1452-1519) and sciences (e.g., Andreas Vesalius, 1514-1564) started to doubt the correctness of Galen’s translated, summarized, and again translated anatomical descriptions.

Their drive was sincerely Aristotelian, in other words: having dissected personally they eventually could identify many differences with regard to Galen. Galen however, had extrapolated comparative vertebrate morphology to human anatomy. Consecutive

translators, not being familiar with these most intricate anatomical differences from their own experiences, could have easily overlooked such details. Most academics were not aware of these and other differences. It is accepted, however, that Vesalius in turn may have been greatly inspired by e.g. Rhazes [6].

## Material & Methods

**Simulation.** Starting from the hypothesis that “a translation is, or may be, a corruption of the original”, we simulated - anachronistically though - the possible fate of the originally Greek descriptions by Galen (2<sup>nd</sup> - 3<sup>rd</sup> century CE).

**Control experiment.** As a control experiment therefore, the original ancient Greek description of the well-known Christmas story from Luke's Gospel (1<sup>st</sup> century CE) [9], was translated automatically by means of Google Translate ® (\*).

**Translation Test.** Luke's original ancient *Greek* text was translated into *Arabic*, after which these now Arabic sentences were translated again - namely into *Latin*. For convenience, this Latin translation was finally translated into present-day English. Thereafter, this English text was carefully checked for its comprehensibility. This whole procedure was performed several times, and also on different moments, namely during three consecutive days in September 2014.

## Results

Rather to our surprise, as a consequence of translation procedures, **40 % - 50 %** of the original ancient Greek text had **disappeared** or was **corrupted**, or **lost in translation**. This apparently was the result of producing untranslatable and / or incomprehensible, and / or even inappropriate words - sometimes whole phrases.

## Discussion

In spite of the surprising results of our translation test, these are nevertheless in accordance with modern Translation Quality Assessment (TQA) Research [10].

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(\*). Also see: Groves M, Mundt K (2015) *Friend or foe ? Google Translate in language for academic purposes. English for Specific Purposes*, 37, 112-121.

Now with respect to Vesalius and his followers, it may be said that this attitude of “examine and verify everything yourself” - so essential for today’s science -, started during the Renaissance indeed [6]. In view of several other great, e.g., geographical discoveries starting in the 15<sup>th</sup> and 16<sup>th</sup> century [11], Vesalius may be characterized as a pre-eminent Renaissance craftsman, observer, scholar and author. His life’s anatomical work “De Humani Corporis Fabrica” (1543) describes, presents and shows man’s *internal geography* in convincingly correct ways despite well-intentioned spiritual advices by authors such as Augustine [2]. Furthermore, though Vesalius’ “corrections” of Galen may have come down to “*correcting long-standing errors in observation and translation*”, one still wonders which other elements may have contributed to the continuing success of his work.

We consider the following factors, some of which are also inherent to anatomy.

1. In the Middle Ages but also later, confirming evidence as well as canonization did play a role in curiosity about our inner body [12] [13].
2. The overwhelming images (woodcuts) of Vesalius’ anatomical dissections resulted from the close collaboration between Vesalius as a physician and an anatomist, and a visual artist - most likely Jan Stephan van Calcar [14]. Some Western European rules of perspective-in-the-arts however, were not fully respected in his anatomical illustrations [15]. Anatomically, 3-D representation is important even now, e.g., in anatomical modelling [16].
3. In words and images the “Fabrica” demonstrates, taking us “by the hand”, disputing and arguing in academic style. Therefore, also didactically, our personal experience has convinced us that most of Vesalius’ “take-home messages” are surprisingly “lifelike” and vivid - not to say quasi-modern.
4. Around the start of the 16<sup>th</sup> century, Alessandro Benedetti (1450-1512) was a professor of Anatomy and Surgery at the University of Padua. Having “obtained his degree in Padua in 1475, he stayed for many years on the (*Greek !*) island of Crete, where he practiced medicine and, in 1490, began to teach medicine in Padua” [17]. His “*Historia corporis humani sive anatomice*” (1493) was mainly a compendium of descriptive anatomy” [17]. Thanks to this Greek experience, Benedetti was one of the first doctors and anatomists competent to read, understand, and directly translate Galen from Greek - only a few decades before Vesalius. Figuring out this Greek anatomical terminology was an enormous help. Most terms then appeared in Greek in Vesalius’ early work “*Tabulae Sex*” (1538) [6].
5. Apart from his Greek terms, many of which became the official names, Benedetti was also the first to propose and to construct “*temporaria*” or “*amphitheatres*”, to demonstrate and attend anatomical dissections. In the next centuries, most universities possessed a “*theatrum anatomicum*” [18].

## Conclusion

The intention of Vesalius - possibly after Rhazes - to correct Galen's mistakes, may have been helped greatly by his initial contacts with the original Byzantine / Greek texts of Galen, translated by Benedetti during his medical practice on the island of Crete. It may also serve as an example of early East-West cooperation.

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Ключевые слова: анатомия, Везалиус, Гален, история медицины  
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